

## BAB V

### PERENCANAAN BALOK B1

#### 5.1 Direncanakan Balok WF 150 x 75 x 5 x 7

$W_k := 14 \text{ kg/m}$	$A_k := 17.85 \text{ cm}^2$	$Z_x := 98 \text{ cm}^3$
$h := 150 \text{ mm}$	$i_x := 6.11 \text{ cm}$	$Z_y := 21 \text{ cm}^3$
$b := 75 \text{ mm}$	$i_y := 1.66 \text{ cm}$	$G := 80000 \text{ Mpa}$
$t_f := 7 \text{ mm}$	$I_x := 666 \text{ cm}^4$	$E := 200000 \text{ Mpa}$
$t_w := 5 \text{ mm}$	$I_y := 49.5 \text{ cm}^4$	
	$L_b := 100 \text{ cm}$	

#### Mutu Baja BJ 37 :

$$f_y := 240 \text{ Mpa}$$

$$f_u := 370 \text{ Mpa}$$

- Kontrol Kuat Geser

$$\frac{h}{t_w} = 30$$

$$\frac{1100}{\sqrt{f_y}} = 71$$

$$\text{karena } \frac{h}{t_w} < \frac{1100}{\sqrt{f_y}} \text{ ( penampang plastis )}$$

$$V_n := 0.6 \cdot 10 \cdot f_y \cdot \left( \frac{h \cdot t_w}{100} \right) = 10800 \text{ kg}$$

$$\phi V_n := 0.9 \cdot V_n = 9720 \text{ kg}$$

Dari hasil perhitungan SAP didapatkan nilai,  $V_u := 115.78 \text{ kg} < \phi V_n = 9720 \text{ kg}$

- Kontrol Kuat Momen Lentur

- Local Buckling

SAYAP

$$\frac{b}{2 \cdot t_f} = 5.36$$

$$\frac{170}{\sqrt{f_y}} = 10.97$$

BADAN

$$\frac{h}{t_w} = 30$$

$$\frac{1680}{\sqrt{f_y}} = 108.44$$

Penampang kompak sehingga  $M_n = M_p := Z_x \cdot 2400 = 235200 \text{ kgcm}$

- Lateral Buckling

$L_b := 100 \text{ cm}$  ( pasang balok pengaku  $t = 8 \text{ mm}$  jarak  $100 \text{ cm}$  )

Dari Tabel Ir. Marwan Ibrahim perhitungan panjang  $L_p$  dan  $L_r$  untuk profil balok didapatkan :

BJ 37 didapatkan nilai  $L_p := 84.339 \text{ cm}$

$L_r := 314.812 \text{ cm}$

$L_p < L_b < L_r$  sehingga balok termasuk bentang pendek

Dari hasil perhitungan SAP didapatkan nilai

$M_n := M_p = 235200 \text{ kgcm}$

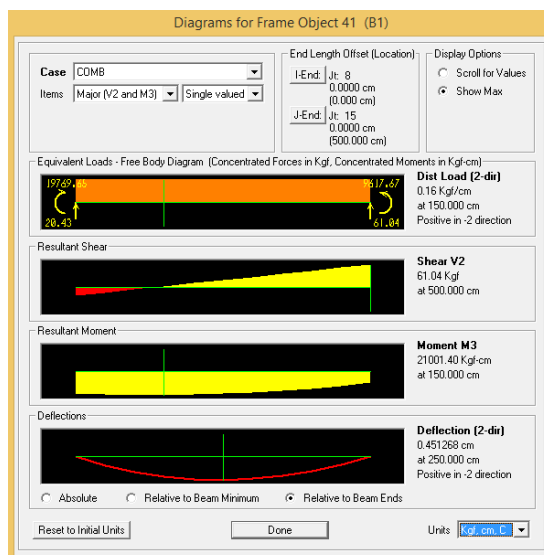
$$\phi M_n := \frac{0.9 \cdot M_p}{100} = 2116.8 \text{ kgm} \quad \blacksquare > \blacksquare \quad M_u := 366.69 \text{ kgm (Output SAP 2000)}$$

## 5.2 Kontrol lendutan

$L := 500 \text{ cm}$

$$\text{lendutan izin } f_{ijin} := \frac{L}{360} = 1.39 \text{ cm}$$

Lendutan akibat beban envelope hasil SAP



$$\Delta := 0.563 \text{ cm} \quad \blacksquare < \blacksquare \quad f_{ijin} = 1.39 \text{ cm} \quad \text{OK..!}$$